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7590

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EXAMINER

PATEL, ISHWARBHAI B

ART UNIT

PAPER NUMBER

2827

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Please find below and/or attached an Office communication concerning this application or proceeding.

## 2827

Part of Paper No. 0503

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-3, 6-7 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yacoub, US Patent No. 6,224,399, in view of Nakamura et al., US Patent No. 4,949,455, hereafter Nakamura.

Regarding claim 1 and 3 Yacoub discloses a surface mount contact for attachment to a circuit board, comprising:

an elongate electrically conductive pin defining a shaft having a longitudinal axis and having an upper end and a lower end (pin 110, see figure 3, column 3, line 10-20);

an insulator surrounding the shaft of the pin intermediate the upper and lower ends (molded strip 100 of insulating material, see figure 3, column 3, line 24-25); but

fails to disclose a pre-formed heat reflowable bonding member attached to the lower end of the pin.

Nakamura discloses electrical pin with solder secured to the end surface, see Nakamura figure 2.

Such solder on the pin will help in better connection joint, providing enough solder material, even if, the pad with which the pin is connected have less solder material or no solder material.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the surface mount contact of Yacoub with heat reflowable bonding member secured to end surface, as taught by Nakamura, in order to provide enough bonding material for stronger connections joints.

Regarding claim 2, the combination of Yacoub and Nakamura further discloses the pin with cylindrical cross section; see Yacoub, figure 3, column 2, line 60-65.

Regarding claim 6, the combination of Yacoub and Nakamura further discloses the insulator as collar, see Yacoub, figure 3.

Regarding claim 7, the combination of Yacoub and Nakamura further discloses the pre-formed heat reflowable bonding member is a solder ball, see Nakamura, figure 2, though it is shown as half sphere, it can be a full sphere.

Regarding claim 9, the combination of Yacoub and Nakamura further discloses the insulator made of plastic, see Yacoub, column 2, line 33-40, and as it with stand the temperature during the connection, will inherently be a high temperature plastic.

Regarding claim 10, the combination of Yacoub and Nakamura further discloses the collar press fit around the pin; see Yacoub figure 3, column 3, line 24-30.

2. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Yacoub and Nakamura, as applied to claims 1-3 above, and further in view of Chen, US Patent No. 6,426,880.

Regarding claim 4, the applicant is claiming at least one channel that opens through an outer surface of the head and a peripheral wall of the head.

Though, the combination of Yacoub and Nakamura does not disclose such channel, providing such channel for increasing the contact area for better bonding, either solder bonding or adhesive bonding, is known in the art.

Chen discloses terminals with channels; see Chen, figure 4, for increasing the contact area.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the surface mount contact of the combination of Yacoub and Nakamura with at least one channel that opens through an outer surface of the head and a peripheral wall of the head, as taught by Chen, in order to have the larger area of contact for better bonding.

3. Claims 5 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Yacoub and Nakamura as applied to claims 1-3 above, and further in view of Pitzele, US Patent No. 6,545,890.

Regarding claim 5, the applicant is claiming a shoulder on the pin for establishing a predetermined vertical position along the longitudinal axis relative to a reference surface, such shoulder on the pins are known in the art, apparently to better locate the pin in the position and maintain desired spacing.

Pitzele discloses such pins with shoulders, see Pitzele, figure 9D.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the surface mount contact of the combination of Yacoub and Nakamura, with a shoulder on the pin, as taught by Pitzele, in order to better locate the pin in the position and maintain desired spacing.

Regarding claim 8, the combination of Yacoub and Nakamura does not disclose a conductive pad on the insulator, a conductive pad on the insulator is as good as another shoulder, as applied to claim 5 above, which will help in better bonding of the contact pin with the respective reference surface and locating the pin at the desired location.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the surface mount contact of the combination of Yacoub and Nakamura, with the insulator with conductive pad on the insulator, in order to have better bonding of the pins with respective reference surface.

Regarding claim 21, the combination of Yacoub, Nakamura and Pitzele discloses all the features of the claimed invention, including the insulator with conductive pad as applied to claim 8 above.

Regarding claim 22, the combination of Yacoub, Nakamura and Pitzele discloses all the features of the claimed invention, including the pre-formed heat reflowable bonding member is a solder ball, as applied to claim 7 above.

Regarding claim 23 and 24, the applicant is claiming the relative position of the insulator, pin extends above the conductive pad formed on the upper surface of the insulator, as claimed in claim 23 and pin does not extend above the conductive pad formed on the upper surface of the insulator, as claimed in 24.

Though, the combination of Yacoub, Nakamura and Pitzele does not disclose such arrangement of the insulator, explicitly, it can be adjusted any where on the pin to have desired spacing and the type of connection structure, such as bonding or press fitting of the pin. In fact, the pin of Yacoub, does extend the insulator.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the combination of Yacoub, Nakamura and Pitzele, with arrangement of the insulator as claimed in claim 23 and 24, in order to have the desired spacing and the connection structure.

Regarding claim 25, though the combination of Yacoub, Nakamura and Pitzele does not explicitly disclose the insulator and conductive pad formed of copper clad FR-4 material, copper clad FR-4 material is well known in the art and available at low cost.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the combination of Yacoub, Nakamura and Pitzele, with the insulator and conductive pad formed of copper clad FR-4 material, in order to have the contact with lower cost.

Further, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Regarding claims 11-17 and 19-20, the combination of Yacoub, Nakamura, and Pitzele, further discloses circuit board assembly with upper and lower circuit board generally in parallel, see Pitzele, figure 11, with two conductive solder joint and the modified pin as applied to claims 1-3, 5-10 and 21-25 above.

4. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Yacoub, Nakamura, and Pitzele, as applied to claims 1-10 and 21-25 above, in view of Chen, as applied to claim 4 above.

In claim 18, the applicant is claiming a channel that opens through an outer surface of the head and a peripheral wall of the head. Though, the combination of



Yacoub, Nakamura, and Pitzele, does not disclose the channel, as applied to claim 4, above, it is known in the art to provide channel to increase the contact area for better connection joint.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the surface mount contact of the combination of the combination of Yacoub, Nakamura, and Pitzele with a pin having one channel that opens through an outer surface of the head and a peripheral wall of the head, as taught by Chen, in order to have the larger area of contact for better bonding.

### ***Conclusion***

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Downes et al., discloses an electrical contact with solder preform 32 on the pin with single or multiple flange, see figure 1-5.

Suehiro et al., discloses I/O pin with perform solder and insulating collar, see figure 3A-3C, including connection of two circuit board, see figure 11.

Kimura et al., discloses a circuit board with pin having flange section with solder or only solder without flange, see figure 1B and 4.

Akram discloses multiple stacked substrates connected with column like electrically conductive structure.

Dibble et al., discloses connector pin with hertz dot (raised spherical portion) on the top of the head.

Masato Tanaka discloses pin with collar.

Naoto Ishida discloses conductor pin with collar, with the location of the collar adjusted such that, either the pin tip remain into the substrate, figure 6, 8 and 9 or remain flush with substrate, figure 15.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ishwar (I. B.) Patel whose telephone number is (703) 305 2617. The examiner can normally be reached on M-F (8:30 - 5).


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David L Talbott can be reached on (703) 305 9883. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305 3431 for regular communications and (703) 305 7724 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308 0956.

ibp  
May 29, 2003



Handwritten signature, likely of the receptionist, with a date stamp below it.